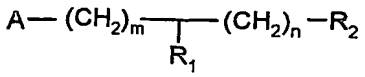
Claims

1. A compound of structural formula (I):



(I)

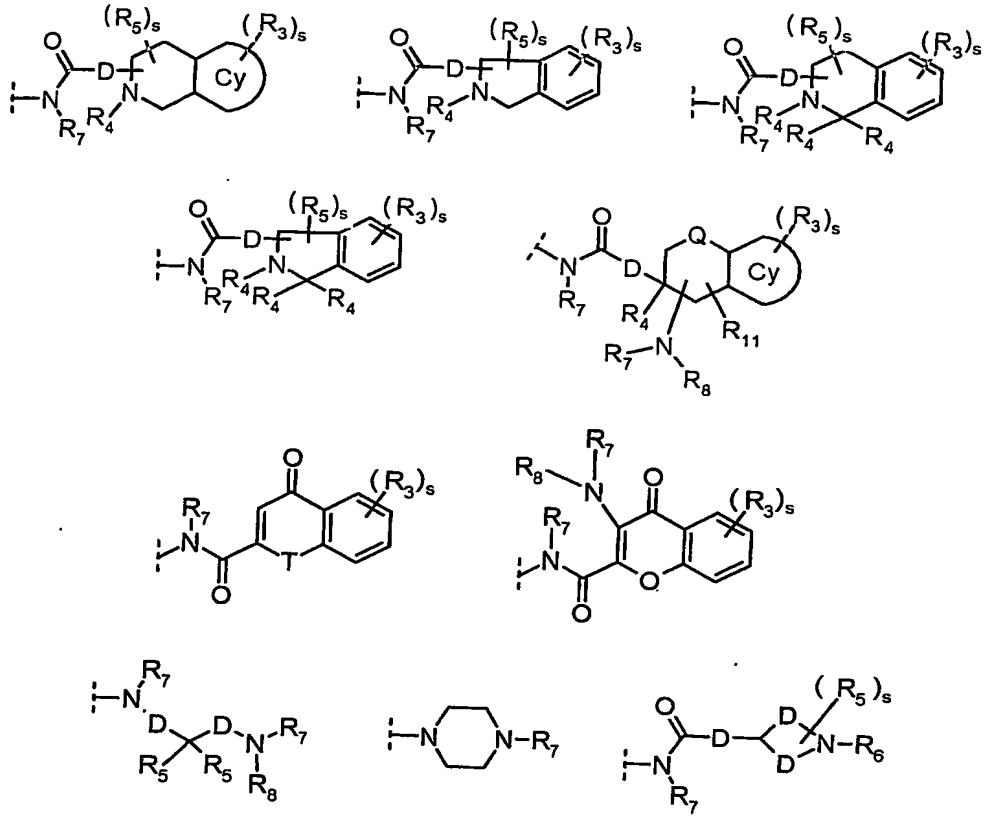
or a pharmaceutically acceptable salt or a solvate thereof, wherein

R_1 is:

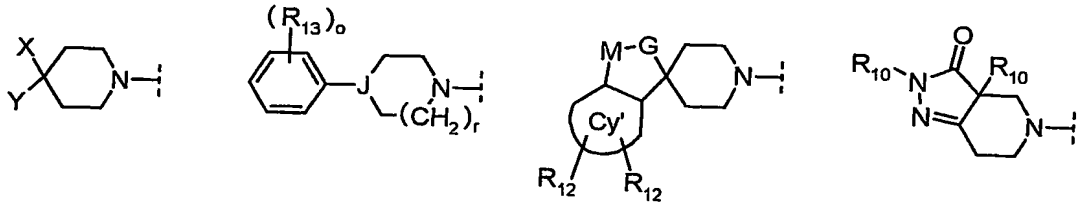
(D)-aryl or (D)-heteroaryl,

wherein aryl and heteroaryl are unsubstituted or substituted;

R_2 is:



A is:



each R_3 is independently:

hydrogen,

halo,

alkyl,
haloalkyl,
hydroxy,
alkoxy,
S-alkyl,
SO_2-alkyl,
O-alkenyl,
S-alkenyl,
$NR_{15}C(O)R_{15}$,
$NR_{15}SO_2R_{15}$,
$N(R_{15})_2$,
(D)-cycloalkyl,
(D)-aryl (wherein aryl is phenyl or naphthyl),
(D)-heteroaryl,
(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen), and
wherein aryl, heteroaryl, heterocyclyl, alkyl and cycloalkyl is unsubstituted or substituted, and two adjacent R_3 may form a 4- to 7-membered ring;

each R_4 is independently:
hydrogen,
alkyl,
C(O)-alkyl,
SO_2alkyl,
SO_2aryl,
(D)-aryl or
(D)-cycloalkyl;

each R_5 is independently:
hydrogen,
alkyl,

(D)-aryl,
(D)-heteroaryl,
(D)-$N(R_7)_2$,
(D)-$NR_7C(O)$-alkyl,
(D)-NR_7SO_2-alkyl,
(D)-$SO_2N(R_7)_2$,
(D)-$(O)_q$-alkyl,
(D)-$(O)_q$(D)-NR_7COR_7,
(D)-$(O)_q$(D)-$NR_7SO_2R_7$,
(D)-$(O)_q$-heterocyclyl or
(D)-$(O)_q$(alkyl)-heterocyclyl;

each R_6 is independently:
hydrogen,
alkyl,
(D)-phenyl,
C(O)-alkyl,
C(O)-phenyl,
SO_2-alkyl or
SO_2-phenyl;

R_7 and R_8 are each independently:
hydrogen,
alkyl or
(D)-cycloalkyl, or
R_7 and R_8 together with the nitrogen to which they are attached form a 5- to 8-membered ring optionally containing an additional heteroatom selected from O, S and NR_4,
wherein alkyl and cycloalkyl are unsubstituted or substituted;

R_{10} is independently:
hydrogen,
alkyl,
(D)-aryl or
(D)-cycloalkyl;

R_{11} is:
hydrogen or
alkyl;

R_{12} is:
hydrogen,
halo,
alkyl,
alkoxy,
C≡N,
CF_3 or
OCF_3;

R_{13} is independently:
hydrogen,
hydroxy,
cyano,
nitro,
halo,
alkyl,
alkoxy,
haloalkyl,
(D)-$C(O)R_{15}$,
(D)-$C(O)OR_{15}$,

(D)-$C(O)SR_{15}$,
(D)-C(O)-heteroaryl,
(D)-C(O)-heterocyclyl,
(D)-$C(O)N(R_{15})_2$,
(D)-$N(R_{15})_2$,
(D)-$NR_{15}COR_{15}$,
(D)-$NR_{15}CON(R_{15})_2$,
(D)-$NR_{15}C(O)OR_{15}$,
(D)-$NR_{15}C(R_{15})=N(R_{15})$,
(D)-$NR_{15}C(=NR_{15})N(R_{15})_2$,
(D)-$NR_{15}SO_2R_{15}$,
(D)-$NR_{15}SO_2N(R_{15})_2$,
(D)-NR_{15}(D)-heterocyclyl,
(D)-NR_{15}(D)-heteroaryl,
(D)-OR_{15},
OSO_2R_{15},
(D)-$[O]_q$(cycloalkyl),
(D)-$[O]_q$(D)-aryl,
(D)-$[O]_q$(D)-heteroaryl,
(D)-$[O]_q$(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen when q=1),
(D)-SR_{15},
(D)-SOR_{15},
(D)-SO_2R_{15} or
(D)-$SO_2N(R_{15})_2$,
wherein alkyl, alkoxy, cycloalkyl, aryl, heterocyclyl and heteroaryl are unsubstituted or substituted;

each R_{15} is independently:
hydrogen,

alkyl,
haloalkyl,
(D)-cycloalkyl,
(D)-aryl (wherein aryl is phenyl or naphthyl),
(D)-heteroaryl,
(D)-heterocyclyl (wherein heterocyclyl excludes a heterocyclyl containing a single nitrogen), and
wherein aryl, heteroaryl, heterocyclyl, alkyl and cycloalkyl is unsubstituted or substituted;

R_{17} is independently:
R_{10} or
(D)-heterocyclyl;

R_{18} is independently:
R_{10},
(D)-heteroaryl,
(D)-heterocyclyl,
(D)-$N(Y)_2$,
(D)-NH-heteroaryl or
(D)-NH-heterocyclyl,
wherein aryl, heteroaryl, alkyl, D, cycloalkyl and heterocyclyl are unsubstituted or substituted, or
two R_{18} groups together with the atoms to which they are attached form a 5- to 8-membered mono- or bi-cyclic ring system optionally containing an additional heteroatom selected from O, S, NR_{10}, NBoc and NZ;

Cy is:
aryl,
5- or 6-membered heteroaryl,

5- or 6-membered heterocyclyl or
5- or 7-membered carbocyclyl;

Cy' is:

benzene,
pyridine or
cyclohexane;

X is:

alkyl,
(D)-cycloalkyl,
(D)-aryl,
(D)-heteroaryl,
(D)-heterocyclyl,
(D)-C≡N,
(D)-$CON(R_{17}R_{17})$,
(D)-CO_2R_{17},
(D)-COR_{17},
(D)-$NR_{17}C(O)R_{17}$,
(D)-$NR_{17}CO_2R_{17}$,
(D)-$NR_{17}C(O)N(R_{17})_2$,
(D)-$NR_{17}SO_2R_{17}$,
(D)-$S(O)_pR_{17}$,
(D)-$SO_2N(R_{17})(R_{17})$,
(D)-OR_{17},
(D)-$OC(O)R_{17}$,
(D)-$OC(O)OR_{17}$,
(D)-$OC(O)N(R_{17})_2$,
(D)-$N(R_{17})(R_{17})$ or
(D)-$NR_{17}SO_2N(R_{17})(R_{17})$,

wherein aryl, heteroaryl, alkyl, D, cycloalkyl and heterocyclyl are unsubstituted or substituted;

Y is:

hydrogen,
alkyl,
(D)-cycloalkyl,
(D)-aryl,
(D)-heterocyclyl or
(D)-heteroaryl,
wherein aryl, heteroaryl, alkyl, D and cycloalkyl are unsubstituted or substituted;

Q is a bond, O, $S(O)_u$, NR_6 or CH_2;
D is a bond or C_1 - C_4 alkyl;
E is O, S or NR_6;

G is D, CH-alkyl, O, C=O or SO_2, with the proviso that when G is O, the ring atom M is carbon;

J is N or CH;

M is $CHCO_2Y$, $CHC(O)N(Y)_2$, NSO_2R_{18}, $CHN(Y)COR_{18}$, $CHN(Y)SO_2R_{18}$, $CHCH_2OY$ or $CHCH_2$heteroaryl;

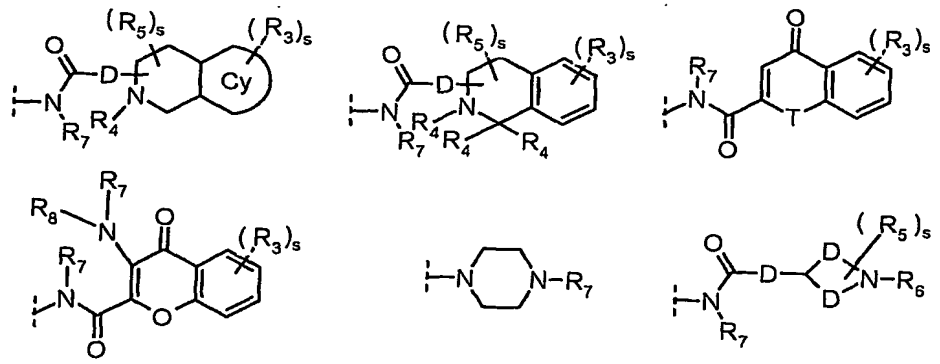
T is O or NR_7;
n is 0 - 3;
m is 1 - 3;
o is 0 - 3;
p is 0 - 2;

q is 0 or 1;
r is 1 or 2;
s is 0 - 3;
u is 0 - 2.

2. The compound of claim 1, wherein

R_1 is (D)-aryl which may be substituted with one to three substituents independently selected from the group consisting of cyano, nitro, perfluoroalkoxy, halo, alkyl (D)-cycloalkyl, alkoxy, hydroxy and haloalkyl;

R_2 is:



R_3 is independently:

hydrogen,
halo,
alkyl,
hydroxy,
alkoxy,
S-alkyl,

SO_2-alkyl,
O-alkenyl,
S-alkenyl,
haloalkyl or
(D)-cycloalkyl;

R_4 is:
hydrogen or
alkyl;

each R_5 is independently:
hydrogen,
alkyl,
(D)-aryl,
(D)-heteroaryl,
(D)-$N(R_7)_2$,
(D)-$NR_7C(O)$alkyl or
(D)-NR_7SO_2alkyl;

R_7 and R_8 are each independently:
hydrogen,
alkyl or
cycloalkyl, or
R_7 and R_8 together with the nitrogen to which they are attached form a 5- to 7-membered ring optionally containing an additional heteroatom selected from O, S and NR_4;

R_9 is:
alkyl,
OR_{10},

(D)-aryl,
(D)-cycloalkyl,
(D)-heteroaryl and
halo;

R_{12} is:
hydrogen,
halo,
alkyl,
alkoxy or
C≡N;

R_{13} is independently:
hydrogen,
hydroxy,
cyano,
nitro,
halo,
alkyl,
alkoxy,
haloalkyl,
(D)-C(O)-heterocyclyl,
(D)-$N(R_{15})_2$,
(D)-$NR_{15}COR_{15}$,
(D)-$NR_{15}CON(R_{15})_2$,
(D)-$NR_{15}C(O)OR_{15}$,
(D)-$NR_{15}C(R_{15})=N(R_{15})$,
(D)-$NR_{15}C(=NR_{15})N(R_{15})_2$,
(D)-$NR_{15}SO_2R_{15}$ or
(D)-$NR_{15}SO_2N(R_{15})_2$;

each R_{14} is independently:
hydrogen,
halo,
alkyl,
(D)-cycloalkyl,
alkoxy or
phenyl;

each R_{15} is independently:
hydrogen,
halo,
alkyl,
(D)-cycloalkyl,
alkoxy or
phenyl;

each R_{16} is independently:
hydrogen,
alkyl or
cycloalkyl;

X is:
alkyl,
(D)-cycloalkyl,
(D)-aryl,
(D)-heteroaryl,
(D)-heterocyclyl,
(D)-$NHC(O)R_{17}$,
(D)-CO_2R_{17} or

(D)-CON($R_{17}R_{17}$);

Y is:

hydrogen,
alkyl,
(D)-cycloalkyl,
(D)-aryl,
(D)-heterocyclyl or
(D)-heteroaryl;

Cy is:

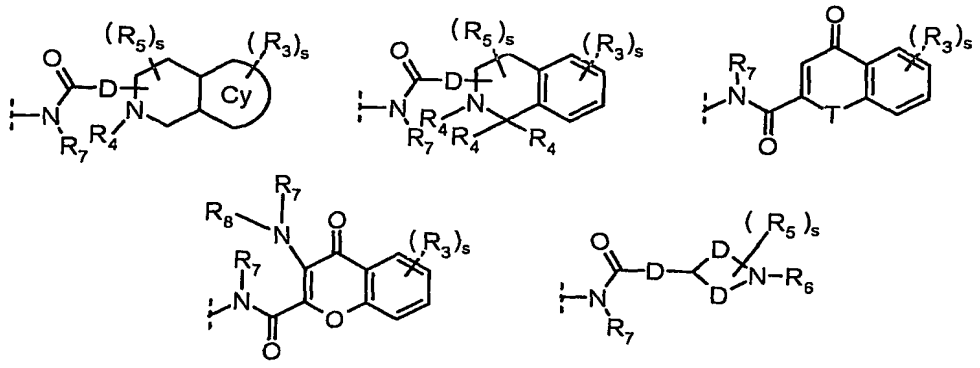
aryl,
5- or 6-membered heteroaryl,
5- or 6-membered heterocyclyl or
5- to 7-membered carbocyclyl;

Cy' is benzene or pyridine;
D is a bond or C_1 - C_4-alkylene;
M is NSO_2R_{18}, $CHN(Y)COR_{18}$ or $CHN(Y)SO_2R_{18}$;
G is D or CH-alkyl;
T is NR_7 or O;
n is 0 or 1;
m is 1 or 2;
r is 1;
s is 0, 1 or 2.

3. The compound of claims 1 or 2, wherein

R_1 is (D)-phenyl or (D)-naphthyl which may be substituted with one or two substituents independently selected from the group consisting of perfluoroalkoxy, halo, alkyl, alkoxy and haloalkyl;

R_2 is:



R_3 is hydrogen or halo;

R_4 is hydrogen;

R_5 is hydrogen;

R_7 and R_8 are each independently:

hydrogen or

alkyl, or

R_7 and R_8 together with the nitrogen to which they are attached form a 5- to 6-membered ring optionally containing an additional oxygen atom;

R_{12} is:

hydrogen,

halo or

C_1 - C_4 alkyl;

R_{13} is independently:
cyano,
nitro,
halo,
alkyl,
(D)-C(O)-heterocyclyl,
(D)-$N(R_{15})_2$,
(D)-$NR_{15}COR_{15}$,
(D)-$NR_{15}CON(R_{15})_2$,
(D)-$NR_{15}C(O)OR_{15}$ or
(D)-$NR_{15}SO_2R_{15}$;

each R_{14} is independently:
hydrogen,
halo,
alkyl,
alkoxy or
phenyl;

each R_{15} is independently:
hydrogen,
halo,
alkyl,
alkoxy or
phenyl;

X is:
alkyl,

(D)-cycloalkyl,
(D)-heterocyclyl,
(D)-$NHC(O)R_{17}$ or
(D)-$CON(R_{17}R_{17})$;

Y is:

hydrogen,
alkyl,
(D)-cycloalkyl or
(D)-heterocyclyl;

Cy is

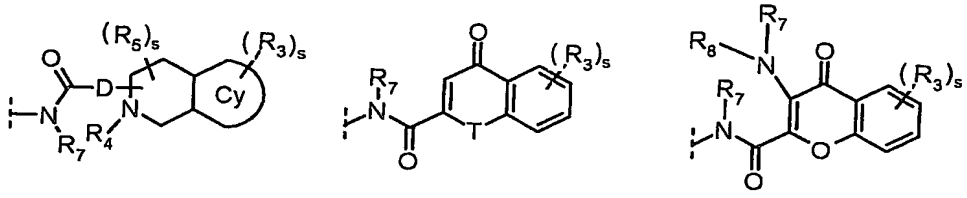
aryl or
5- or 6-membered heteroaryl;

Cy' is benzene;
D is a bond or CH_2;
M is NSO_2R_{18};
G is D;
s is 0 or 1.

4. The compound of any of claims 1 to 3, wherein

R_1 is (CH_2)-phenyl or (CH_2)-naphthyl which may be substituted with one to three halo atoms;

R_2 is:



R_{12} is hydrogen;

R_{13} is independently:

cyano,
nitro,
halo or
(D)-$NR_{15}COR_{15}$;

X is:

C_1 - C_4 alkyl,
C_5 - C_7 cycloalkyl,
(D)-$CON(R_{17}R_{17})$ or
N-containing heterocyclyl;

Y is:

hydrogen,
C_1 - C_4 alkyl or
C_5 - C_7 cycloalkyl;

Cy is aryl;

G is CH_2.

5. The compound of any of claims 1 to 4 for use as a medicament.

6. Use of the compound of any of claims 1 to 4 for the preparation of a medicament for the treatment or prevention of disorders, diseases or conditions responsive to the inactivation or activation of the melanocortin-4 receptor.

7. Use according to claim 6 for the treatment or prevention of cancer cachexia.

8. Use according to claim 6 for the treatment or prevention of muscle wasting.

9. Use according to claim 6 for the treatment or prevention of anorexia.

10. Use according to claim 6 for the treatment or prevention of anxiety and/or depression.

11. Use according to claim 6 for the treatment or prevention of obesity.

12. Use according to claim 6 for the treatment or prevention of diabetes mellitus.

13. Use according to claim 6 for the treatment or prevention of male or female sexual dysfunction.

14. Use according to claim 6 for the treatment or prevention of erectile dysfunction.

15. A pharmaceutical composition which comprises a compound of any of claims 1 to 4 and a pharmaceutically acceptable carrier.